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A-19095

PATENTS



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Patent Application of)

RAYMOND C. McGARVEY)

Serial No. 07/937,560)

Group Art Unit 2406

Filed: August 31, 1992)

Examiner S. Cummings

For: MINIMUM DEAD VOLUME)
FITTING)

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TRANSMITTAL OF BRIEF FOR APPELLANT

Honorable Commissioner
of Patents and Trademarks
Washington, D.C. 20231

Sir:

Transmitted herewith are the original and two copies of the Brief for Appellant in the above-identified application submitted pursuant to 37 C.F.R. Section 1.192. The fee in this connection in the amount of \$135.00 for a small entity is also attached. Please charge any additional fees or credit overpayment to Deposit Account No. 12-0275.

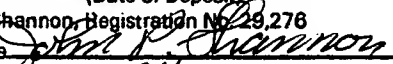
Respectfully submitted,


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Date: 8-2-94

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PATENTS 8/11/94



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
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95-3431

APPEAL BRIEF

Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

This is an appeal from the final Office Action dated July 19, 1994, which is the second of two final Office Actions issued in this case. Although it appears that the first final Office Action was not specifically withdrawn, the second final Office Action appears to differ from the first final Office Action essentially by the addition of a rejection of claims 1-18 and 22 under 35 U.S.C. 112 and the Examiner appears to be treating the first final rejection as if it were withdrawn.

I. Status of Claims

Claims 1-20, 22 and 23 stand finally rejected. Claim 21 was objected to, but has been indicated to be allowable if rewritten in independent form including all of the limitations of the base claim

and any intervening claims. The final rejection of claims 1-20, 22 and 23 is appealed.

II. Status of Amendments

An Amendment Under 37 C.F.R. 1.116, which placed claim 21 in independent form, was filed on June 16, 1994. In response, the Examiner issued an Advisory Action indicating that the amendment would be entered upon the filing of an appeal, and that claim 21 would be allowed.

III. Summary of the Invention

The present invention, as it relates to the claims on appeal, is a face sealing fitting 10 comprising a gasket 12 and at least one tubular member or element 14, 16. The tubular member has an inner diameter and an annular nose or sealing bead 36, 38 projecting from a radial end wall of the tubular member (page 6 of the specification, lines 1-11 and 33-36, and Figs. 1 and 2). The annular sealing bead has, in axial cross section, a rounded outer profile shaped and positioned to engage the gasket to form a high pressure seal, and a rectilinear inner profile defining an open passageway within the tubular member adjacent to the gasket (page 7, lines 7-11 and 33-36). The portions of the beads which project axially the farthest from the tubular elements 14, 16 lie on inner surfaces of the tubular elements which define the flowpath for the fluids. In the embodiment of Fig. 2, before the fitting 10 is in a fully tightened condition, an inner annular surface 39 of the

central circular section 28 of the gasket, which defines the central opening in the gasket, is smaller than the diameter of the flow passage defined by the inner surfaces of the tubular elements. The conical shape of the faces 32 and 34 of the gasket serves to automatically align the annular beads 36, 38 with the gasket 12 and with each other as the beads are forced into tighter engagement with the conical faces (page 7, lines 3-7). The rounded outer profile first contacts conical faces 32, 34 of the gasket and, upon further tightening, the conical faces of the gasket deform to allow the rounded outer profiles of the annular beads 36, 38 to move closer to one another and thereby engage the central circular section 28 of the gasket (page 7, lines 7-15).

Engagement of the beads with the conical surfaces 32, 34 of the gasket and further tightening of the fitting imposes forces on the gasket in a radially outward direction. The annular beads penetrate the conical surfaces, deforming the conical surfaces. As a result, the central circular section of the gasket is expanded radially outward, and the diameter of the inner annular surface 39 is increased (page 7, line 33 - page 8, line 13). The diameter of the inner annular surface 39 of the gasket in its relaxed state is chosen such that tightening of the fitting 10 to its optimum sealing condition results in enlargement of the diameter of the inner annular surface to equal the diameter of the fluid passageway through the tubular members 14, 16. This causes the inner annular surface 39 of the gasket to be flush with the inner surfaces of the tubular members and establishes a zero dead volume condition or at

least a minimum dead volume condition when the fitting is tightened to its optimum sealing condition (page 8, lines 20-30 and Fig. 1).

The axially farthest projecting portions of the sealing beads 36, 38 have an inner diameter which is the same as the diameter of the inner annular surface 39 of the gasket 12. By this structure, no portion of the gasket extends into the flowpath defined by the conduits, and the radially innermost portions of the sealing beads engage the central circular section 28 of the gasket so that there are no spaces or crevices between the tubular members and the gasket (page 9, lines 13-22). The same operating principle applies to the embodiment of Figs. 5 and 6, the difference between the embodiment of Figs. 1 and 2 and the embodiment of Figs. 5 and 6 being that the tubular members 54 and 56 of the embodiment of Figs. 5 and 6 have flaring portions 72 and 74 in the flowpath defined by the tubular members. In addition, the rectilinear inner profile of the sealing beads 76 and 78 is colinear with the flaring portions 72, 74 of the tubular members.

In the embodiments of Figs. 3 and 4, the inner annular surface 39' of the gasket is equal to the inner diameter of the axially farthest projecting portions of the annular beads 36 and 38 when the gasket 12 is in its relaxed position. When the fitting 10 is fully tightened, the inner annular surface 39' is enlarged so that its diameter is slightly greater than, although still substantially equal to, the inner diameter of the axially farthest projecting portions of the annular beads 36, 38 (page 10, lines 21-30).

The embodiment of Figs. 7 and 8 is like the embodiment of Figs. 3 and 4 in that the inner annular surface 64 of the gasket is enlarged from a diameter equal to the inner diameter of the axially farthest projecting portions of the annular beads 76 and 78. It is different from the embodiment of Figs. 3 and 4 in that the tubular members 54 and 56 have the flaring portions 72 and 74.

The embodiments of Figs. 9 and 10, Figs. 11 and 12, Figs. 13 and 14, and Figs. 15 and 16 each correspond to one of the embodiments already described but include as well a feature to prevent overtightening of the fitting. Although the overtightening feature is illustrated in all of Figs. 9-16, it will be described here only with reference to Figs. 9 and 10. After formation of the seal, which is the condition of the fitting in Fig. 10, the radial sidewalls 102, 103 of the outer section 94 of the gasket 80 engage the radial end walls 104, 105 of the tubular elements 54, 56. When these flat surfaces meet, further axial movement of the tubular members with respect to the gasket is prevented, and deformation beyond the elastic limits of the sealing beads is prevented. An assembler can easily sense the point when the two flat surfaces meet because the resistance on the coupling nut 22 (Fig. 1) quickly and severely increases (page 16, line 36 - page 17, line 9).

IV. The References

The Examiner has relied upon the following references in the Final Rejection:

| <u>Reference Number</u> | <u>Name</u> | <u>Date</u> |
|-------------------------|-------------|-------------------|
| U.S. 5,222,747 | McGarvey | June 29, 1993 |
| U.S. 4,854,597 | Leigh | August 8, 1989 |
| U.S. 906,761 | White | December 15, 1908 |
| WO 89/03495 | Genou | April 20, 1989 |

V. Issues

The issues presented for consideration in the appeal are:

1. Whether the Examiner erred in rejecting claims 1-18 and 22 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention;

2. Whether the Examiner erred in holding that claims 1-18, and 22 are not directed to the elected subject matter;

3. Whether the Examiner erred in rejecting claims 19 and 20 under obviousness-type double patenting as being unpatentable over claims 1, 6 and 9 of U.S. Patent No. 5,222,747;

4. Whether the Examiner erred in rejecting claim 23 under obviousness-type double patenting as being unpatentable over claims 1, 6 and 9 of U.S. Patent No. 5,222,747 in view of the Leigh reference;

5. Whether the Examiner erred in rejecting claim 23 under 35 U.S.C. 102(b) as being anticipated by PCT reference WO 89/03495; and

6. Whether the Examiner erred in rejecting claims 19, 20 and 23 under 35 U.S.C. 103 as being unpatentable over the Leigh reference in view of the White reference.

VI. Grouping of Claims

Claims 1-17 stand or fall together. Claim 20 stands or falls with claim 19. Claims 18, 22 and 23 should be considered individually.

VII. Argument

1. Whether the Examiner Erred in Rejecting Claims 1-18 and 22 Under 35 U.S.C. 112, Second Paragraph, as Being Indefinite for Failing to Particularly Point Out and Distinctly Claim the Subject Matter Which the Applicant Regards as the Invention

As evidence of the indefiniteness of claims 1-18 and 22, the Examiner states that the scope of claims 1-18 and 22 is indefinite, and the Examiner refers to the term "substantially equal". The Examiner has not given any reason that would support a finding that any of claims 1-18 and 22 is indefinite. The only claim language referred to by the Examiner is "substantially equal". Claim 22 does not contain the term "substantially". Claim 18 does not contain the expression "substantially equal", but does contain the expression "substantially the same diameter" (line 11). Claims 1-17 do contain the expression "substantially equal", and it is believed to be well settled that such an expression is definite. With respect to "substantially", a claim which calls for something to substantially have a characteristic covers an apparatus or

method which has exactly that characteristic, as well as something which has some deviation from the exact characteristic. In J. R. Clark Co. v. Jeuder, Paeschke & Frey Co., 119 U.S.P.Q. 161 (CA 7, 1958), the court held that there is more flexibility in "substantially coincident" than in "coincident" alone. In Rehrig Controls Co. v. Maxitrol Co., 149 U.S.P.Q. 19 (DC EMich, 1966) the court held that the operative portions of a valve and seat lying on the surface of a cone are at least substantially conical. In Ex parte Wheeler, 163 U.S.P.Q. 569 (1969), the Board of Appeals held that a surface which is "substantially parallel" to a fixed direction is to all intents and purposes disposed as closely parallel to such direction as is humanly possible. In In re Faunce, 24 U.S.P.Q. 251 (CCPA, 1935), the court held that "substantially equal proportions" means that although the proportions may vary slightly, neither will appreciably predominate. In Natural Research Development Corporation v. Great Lakes Carbon Corporation, et al., 188 U.S.P.Q. 327, (DC Del, 1975), the court found that the term "substantially" in a particular element of a claim is one commonly used in patents to prevent the avoidance of literal infringement by minor changes which do not themselves cause a loss of the benefit of the invention. The court added that there is authority for the proposition that the presence of "substantially" should always be implied in every claim, even when not introduced. Thus, the appellant submits that "substantially equal" is definite.

2. Whether the Examiner Erred in Holding That Claims 1-18, and 22 Are Not Directed to the Elected Subject Matter

The Examiner's statements in connection with the rejection under 35 U.S.C. 112 really appear to relate to whether claims 1-18 and 22 cover certain embodiments of the invention disclosed in the application. The statements do not indicate that the claims are indefinite and do not provide a basis for rejecting the claims under 35 U.S.C. 112.

In responding to the restriction requirement, the appellant elected the species of Figs. 1, 2, 5 and 6 and stated that claims 1-11, 15, 16, 18-21 and 23 read on the elected embodiment, and presented reasons why they so read. In the Office Action of September 2, 1993, the Examiner disagreed with the appellant's assertion and found that claims 1-18 and 22 were not drawn to the elected invention. In the amendment filed in response to that Office Action, the appellant presented reasons why claims 1-11, 15, 16 and 18 do read on the elected invention and requested consideration of those claims by the Examiner. Section 821 of the MPEP states that an applicant may traverse an Examiner's holding that claims are not directed to the elected subject matter and also states that the propriety of the holding, if traversed, is appealable. That section further states that, if the Examiner adheres to his position after such traverse, he should reject the claims to which the traverse applies on the ground that they are not directed to the elected subject matter.

The Group Director referred to Section 821 in dismissing the appellant's petition, filed on June 16, 1994, requesting that the

Examiner be directed to act on the claims which stood withdrawn. In the decision, the Group Director provided instructions to the Examiner to treat claims 1-18 and 22 in accordance with MPEP Section 821 in the manner just described.

The Examiner contends that the appellant has defined the term "substantially equal" as being applicable to a structure in which the initial diameter of the seal is equal to that of the tubular members. The appellant submits that an indication that a term in an application is applicable to a structure in the application is not a definition of that term. The appellant used the term "substantially equal" in connection with an embodiment in which the inner diameter of the gasket is slightly greater than the inner diameters of the tubular members when the fitting is in its tightened condition. That does not mean that a claim containing the term "substantially equal" does not also cover embodiments in which the inner diameter of the gasket is more precisely equal to the inner diameters of the tubular members. It is submitted that "substantially equal" covers diameters which are precisely equal, as well as some diameters which are not precisely equal.

The elected species is the species identified by the Examiner as the species of Figs. 1, 2, 5 and 6. In this species, Figs. 1 and 5 show the face seal fitting in a tightened condition. In that condition, as is described in the specification on page 8, lines 20-26, the inner annular surface 39 of the gasket of Fig. 1 is described as being equal to the diameter of the fluid passageway through the glands (tubular members) 14 and 16. In lines 2-6 on

page 12, the specification describes the gasket 52 of Fig. 5 as having an inner annular surface 79 having a diameter equal to the inner diameter of the portions of the noses (sealing beads) 76 and 78 extending axially farthest from the glands 54 and 56.

Claim 1 calls for the inner diameter of the gasket to be "substantially equal" to the inner diameters of the farthest extending portions of the annular end formations (beads). Since these diameters are equal in the species of Figs. 1, 2, 5 and 6, this language of claim 1 covers the species of those figures. Claim 18 calls for the gasket to have an inner cylindrical surface having "substantially the same diameter" as the inner surfaces of the first and second conduits where the conduits engage the gasket. Since the inner cylindrical surface of the gaskets of the species of Figs. 1, 2, 5 and 6 are equal to the diameter of the inner surfaces of the first and second conduits where the conduits engage the gasket, the language of claim 18 calling for the gasket to have "substantially the same diameter" reads on the species defined above. Therefore, it is submitted that claims 1-11, 15, 16, 18-21 and 23 read on the elected species. Accordingly, it is requested that the Examiner's holding that they do not so read not be sustained.

3. Whether the Examiner Erred in Rejecting Claims 19 and 20 Under Obviousness-Type Double Patenting as Being Unpatentable Over Claims 1, 6 and 9 of U.S. Patent No. 5,222,747

In commenting on the rejection of claims 19 and 20 on the ground of obviousness-type double patenting over claims 1, 6 and 9 of the '747 patent, the Examiner stated that it is immaterial

whether the patented claims recite more structural features than is presently being claimed. Ordinarily this is true. However, in the present case, this is not true. In In re Borah, 148 U.S.P.Q. 213 (1966), an applicant filed an application on a basic combination and an additional element after filing an application on a basic combination. A patent issued on the basic combination and the additional element. The CCPA held that the issuance of that patent is not fatal to the applicant's right to obtain a patent to the basic combination.

Claim 19 on appeal is directed to a face seal fitting having certain features. Claims 1, 6 and 9 of the '747 patent are each directed to a face seal fitting having all of the essential features of claim 19 on appeal and other features as well. Previous applications for the basic invention now represented by claim 19 of the present application were filed by the appellant before he filed the application on which the '747 patent is based. The application on which the '747 patent is based, Serial No. 07/694,066, was filed on May 1, 1991. Serial No. 07/652,225, which was directed to the invention represented in present claim 19 and of which the present application is a CIP, was filed on February 6, 1991. Furthermore, that application was a continuation of Serial No. 07/392,460, filed on August 11, 1989.

The subject matter of claims 19 and 20 on appeal was fully disclosed in Serial Nos. 07/652,225 and 07/392,460. Drawing Figs. 1-4 of those applications show all of the structure of claims 19 and 20. Furthermore, the specification of those applications

describes the subject matter of claims 19 and 20 on appeal. Either of the annular noses 36, 38 in the specification of those applications is the annular sealing bead of claim 19 on appeal. The rounded outer profile shape and the rectilinear inner profile shape, in axial cross section, of the annular sealing bead of claim 19 is described in lines 24-29 on page 5 of those applications as: "The noses 36 and 38 having an axial cross section of a sector of a circle...in which a radius defining each sector lies along the inner surface of the glands 14 and 16...". In lines 29-31 of the same page is disclosed the fact that such a joint has substantially no dead volume along the inner diameter of the fitting. With respect to the aligning means of claim 20 on appeal, lines 21-26 on page 4 of those applications states that the conical shape of the faces 32 and 34 of the gasket 12 serves to automatically align the noses 36 and 38 with the gasket and with each other. Thus, applications directed to the basic invention were filed before the filing of the application on which the '747 patent is based.

In resolving the problem presented by this situation, the courts have reasoned that the order of issuance should be disregarded in this special situation and the later issuing generic patent should be upheld if the improvement is patentably distinct from the generic invention. See In re Borah, supra. In In re Braat, 19 U.S.P.Q. 2d 1289 (Fed. Cir. 1991), the court stated: "The rationale behind this proposition is that an applicant (or applicants) who files applications for basic and improvement patents should not be penalized by the rate of progress of the

applications through the PTO, a matter over which the applicant does not have complete control....In this situation, the order of issuance is, in effect, ignored, and the relevant determination becomes whether the improvement is patentably distinct from the generic invention." In In re Bratt, the appellant characterized one invention as an improvement over the other and cited authority for the proposition that when a later filed improvement patent issues before an earlier filed basic invention, a double patenting rejection is only proper against the claims to the basic invention if the improvement is not patentably distinct from the basic invention. The court viewed the two inventions as combination and subcombination, not improvement invention and basic invention, but agreed with the proposition.

The above rule does not apply if a generic claim is filed after a patent issues to a single species (In re Blattner, 114 U.S.P.Q. 299 (CCPA 1957)). With respect to the claims in the present appeal, a claim to the basic invention was on file at least as early as the filing date of the present application, which was August 31, 1992. In fact, claim 19 in just a slightly different form was on file, the only difference between claim 19 on appeal and claim 19 as originally filed in the present application being in the last two lines of the claim, where claim 19 on appeal recites "whereby any dead volume in said fitting is minimized when a sealing condition exists in said fitting" and claim 19 as originally filed recites "so that minimum dead volume exists in said fitting". The date of the granting of the '747 patent was

June 29, 1993. Therefore, the present situation satisfies the condition described in In re Blattner that a generic (or basic) claim was being prosecuted in a pending application at a time when the patent (to the species or the more limited invention) was granted.

Thus, in the present case, the fact that the patented claims recite more structural features than the pending claims is material. These additional features render claims 1, 6 and 9 of the '747 patent, which are directed to the improvement, patentable over the generic invention of claims 19 and 20 of the present application. The obviousness issue turns on the obviousness of the improvement defined in the patent claims over the basic combination. See In re Borah, supra. Claim 1 of the '747 patent calls for the overtightening prevention feature, more specifically, an outer section having an axial dimension which limits compression of the sealing bead beyond its elastic limits by engagement with the radial end wall. Claim 6 of the '747 patent also calls for the overtightening prevention feature, more specifically, it calls for the gasket to have an outer section having an axial dimension which limits the axial movement of the gasket with respect to the tubular members to a predetermined distance which is less than the amount which would cause one of the sealing beads to be stressed beyond its elastic limit. Claim 9 of the '747 patent calls for the overtightening prevention feature in still other terms. More specifically, claim 9 calls for axial dimensions of the sealing bead to be selected to correspond to the axial depth of the beveled

faces so that no space is left between the radially inner side of the gasket and each rectilinear profile when the outer section of the gasket engages the radial end walls of the tubular member. Each of claims 1, 6 and 9 of the '747 patent distinguishes patentably over claims 19 and 20 of the present application in view of at least the distinguishing limitations described above. There is nothing in the prior art to render obvious any modification of the subject matter of claims 19 and 20 of the present application to yield the subject matter of any of claims 1, 6 and 9 of the '747 patent. In view of this, the double patenting rejection set forth in the final rejection is inappropriate and should not be sustained.

4. Whether the Examiner Erred in Rejecting Claim 23 Under Obviousness-Type Double Patenting as Being Unpatentable Over Claims 1, 6 and 9 of U.S. Patent No. 5,222,747 in View of the Leigh Reference

The rejection of claim 23 on the ground of obviousness-type double patenting is inappropriate for the reasons presented above in connection with the obviousness-type double patenting rejection of claims 19 and 20. The Leigh reference applied by the Examiner against claim 23 does not suggest the limitations described above of claims 1, 6 and 9 of the '747 patent which are missing from claim 23 on appeal.

5. Whether the Examiner Erred in Rejecting Claim 23 Under 35 U.S.C. 102(b) as Being Anticipated by PCT Reference WO 89/03495

With respect to the rejection of method claim 23 under 35 U.S.C. 102 as being anticipated by PCT '3495, the appellant points

out that the specific tightening step of claim 23 is not disclosed in the PCT reference. The specific tightening step is: "tightening said annular end formations against said bevel faces to enlarge the inner diameter of said gasket to a diameter substantially equal to the inner diameter of said farthest extending portions of said first and second annular end formations". The Examiner contends that the beveled sealing faces 24', 24 of the PCT '3495 reference are engaged by sealing bead formations that will urge the gasket radially outward. The appellant points out that such an outward urging is not disclosed in the reference. It appears to be the Examiner's position that such a tightening step is inherent in the PCT reference. More specifically, the Examiner states that the end formations of the fitting of the PCT reference act to center the gasket and that the end formations may engage the beveled surface of the gasket before the plane coronal parts come into contact. The appellant points out that the engagement of the beveled surface of the gasket before the plane coronal parts come into contact is the mechanism by which the end formations of the fitting act to center the gasket. Such engagement does not enable tightening as specified in claim 23. If the end formations of the fitting of PCT '3495 engage a portion of the beveled surface, that portion is radially too far inward, and the gasket is not centered. At the same time, the portion of the beveled surface diametrically opposed to the engaged portion lies radially outward farther than it should. The engagement on the first portion of the beveled surface cams the gasket radially

outward on the first side, bringing the opposite side radially inward and, thus, centering the gasket. The engagement merely brings the gasket and end formations into alignment. Since the beveled surfaces of the end portions fit within the beveled surface of the gasket when the gasket is centered, tightening the fitting to get to the position shown in Fig. 2 does not enlarge the inner diameter of the gasket, as is called for by claim 23. Tightening beyond the condition shown in Fig. 2 of the PCT reference will result in the portions of the annular beads engaging the surfaces 23 and 23' of the gasket (Fig. 3) to act axially against the flat, radially extending surfaces 23, 23', which will tend to deform the gasket radially inward.

In the present invention, even when the gasket is centered, the beads engage the beveled surfaces, and they do so before they can engage the radially inward portion of the gasket. As a result, tightening beyond the condition in which the beads just engage the beveled surfaces causes the gasket to deform radially outward and causes the inner diameter of the gasket to increase before the beads engage the radially inward portion of the gasket. Thus, the PCT reference does not anticipate claim 23 under 35 U.S.C. 102.

6. Whether the Examiner Erred in Rejecting Claims 19, 20 and 23 Under 35 U.S.C. 103 as Being Unpatentable Over the Leigh Reference in View of the White Reference

Claim 19 calls for a face seal fitting comprising, among other structure, an annular sealing bead projecting from a radial end wall of the tubular member and having in axial cross section a rectilinear inner profile defining an open passageway within the

tubular member adjacent to the gasket. Claim 20 depends on claim 19. Claim 23 is directed to a method of making a seal in a face seal fitting including annular end formations projecting axially from the end faces of the tubular elements, wherein said annular end formations have portions extending axially the farthest from the end faces of the tubular elements, and each said farthest extending portion lying on the inner surface of its associated tubular element. All of these claims require that the projections 36, 38 or 76, 78 lie on the inner surface of the tubular element which defines a flowpath, and further that the gasket inner diameter is substantially equal to the inner diameters of the farthest extending portions. The Examiner contends that it would have been obvious to modify the Leigh fitting to provide this structure in view of the teaching of White, not because White discloses this structure, but because White allegedly discloses the desirability of achieving zero dead volume. While the 1908 patent to White does disclose the concept of zero dead volume as something to be desired, it does not disclose the structure described above which is recited in claims 19, 20 and 23. More specifically, with respect to claim 19, White does not disclose an annular sealing bead projecting from a radial end wall of a tubular member. If the portions of the flanges 2 extending axially beyond the recesses 4 are considered to be annular sealing beads, the limitations of claim 19 still would not be satisfied because these flange portions do not have an inner profile defining an open passageway within the tubular member. These flange portions are spaced from the open

passageway by the radial dimension of the recess 4. Furthermore, they are separated from the open passageway by the gasket 5. With respect to claim 23, if the portions of the flanges 2 of White extending axially beyond the recesses 4 are considered to be the annular end formations of claim 23, they fail to satisfy the limitation that the farthest extending portion lies on the inner surface of its associated tubular element. The Leigh reference also fails to disclose these structures. In spite of the fact that White fails to disclose the structure wherein the ends of the projections are at the inner surfaces of the conduits in combination with a gasket of the same diameter, the Examiner contends that it would have been obvious to modify the Leigh reference to provide the structure.

Assuming that White is a relevant reference, the appellant submits that the solution to the problem claimed by the appellant is not obvious from the Leigh and White references considered alone or in combination. White discloses the desirability of a gasket and flange structure for coupling pipes together that eliminates pockets at the connection. In White, this feature is achieved by providing recesses 4 in the ends of the pipes 1 to receive the gasket 5 (lines 23-26 of White). These recesses are contiguous with and communicate with the flowpath through the pipes. White does not teach or suggest how such a fitting could be achieved in face seal fittings which employ projecting end formations to engage the gasket. Leigh discloses conventional tubular conduits used in face seal fittings with annular sealing beads projecting from the

conduits at locations spaced radially from the flow path. One of ordinary skill in the art attempting to apply the teachings of White to Leigh might try to make the inner diameter of Leigh's gasket the same as that of the conduit, but there is nothing to suggest the structure recited in appellant's claims.

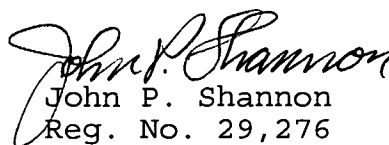
The appellant solves the problem of eliminating crevices in face seal fittings of the type disclosed by Leigh by locating the portions of the end formations which extend axially the farthest from the tubular elements on the inner flowpath defining the surface of an associated tubular element. This feature involves the projecting annular formation, that is, the bead of Leigh, being modified from the semicircular form shown in Leigh. There is nothing in White which would suggest such a modification of the structure shown in Leigh.

White provides no suggestion for minimizing the crevice defined by the inner rounded edges of face seal sealing beads and a gasket. The present invention recognizes that only one half of the rounded sealing bead is necessary to achieve the desired seal and provides a structure that eliminates the inner rounded portions thereby solving a problem. Claims 19, 20 and 23 all are directed either to a face seal fitting or to a method of making a seal in a face seal fitting, but use rounded sealing beads or rounded end formations. In the prior art, a transverse cross section of the beads revealed a symmetrical structure. The rounded portion of the bead that bordered the confines of the tube presented a problem in that an undesirable crevice was created in conventional seals. The

invention solves this problem by radically changing the shape of the sealing bead and corresponding gasket.

In view of the foregoing, it is submitted that the rejection of claims 19, 20 and 23 is in error and should not be sustained. Therefore, a reversal of the final rejection by the Examiner is respectfully requested.

Respectfully submitted,


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(Date of Deposit)

John P. Shannon, Registration No. 29,276

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Date of Sig

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VIII. Appendix

1. A face seal fitting, comprising:

a first tubular element having an end face, an inner surface defining a flowpath and a first annular end formation projecting axially from the end face of said first tubular element;

a second tubular element having an end face, an inner surface further defining said flowpath and a second annular end formation projecting axially from the end face of said second tubular element; and

a metal gasket including

an inner section in the form of an annulus having an axis, and

a tapered section extending radially outward from said inner section, said tapered section defining two bevel faces directed away from one another and inwardly toward the axis of said annulus,

wherein said first annular end formation engages one of said bevel faces in a first region, said second annular end formation engages the other of said bevel faces in a second region, said first and second annular end formations have portions extending axially the farthest from the end faces of said first and second tubular elements, each said farthest extending portion lies on the inner surface of its associated tubular element and has an inner diameter, and said gasket has an inner diameter substantially equal to the inner diameters of said farthest extending portions,

whereby dead volumes along the flowpath through said fitting are minimized.

2. The face seal fitting according to claim 1, wherein said first and second annular end formations each has a profile in axial section defining an arc intersected by a straight line lying along the inner surface of its associated tubular element, the intersection of said line and said arc being at said farthest point.

3. The face seal fitting according to claim 2, wherein the inner surfaces of said first and second tubular elements are cylindrical adjacent to said annular end formations.

4. The face seal fitting according to claim 2, wherein the inner surfaces of said first and second tubular elements have flaring portions extending to said portions of said first and second annular end formations which extend axially the farthest from the end faces of said first and second tubular elements.

5. The face seal fitting according to claim 1, wherein said metal gasket further includes an outer section in the form of an annulus having a first axial dimension, said inner section is concentric with the annulus of said outer section and has a second axial dimension shorter than said first axial dimension, and said tapered section connects said outer section with said inner section.

6. The face seal fitting according to claim 1, wherein said face seal fitting has an optimal sealing condition in which said gasket is clamped between said first and second tubular elements, and said gasket, in a relaxed condition, has an inner diameter smaller than the inner diameter of said farthest extending portions of said first and second annular end formations,

said face seal fitting being movable between a first position, in which a non-sealing condition exists and said gasket is in its relaxed condition, and a second position, in which a sealing condition exists and said inner diameter of said gasket is equal to the inner diameter of said farthest extending portions of said first and second annular end formations.

7. The face seal fitting according to claim 6, wherein each of said first and second annular end formations has a profile in axial section defining an arc intersected by a straight line lying along the inner surface of its associated tubular element, the intersection of said line and said arc being said farthest extending portion.

8. The face seal fitting according to claim 6, wherein the inner surfaces of said first and second tubular elements are cylindrical adjacent to said annular end formations.

9. The face seal fitting according to claim 8, wherein the inner surfaces of said first and second tubular elements have flaring portions adjacent to said annular end formations.

10. The face seal fitting according to claim 6, further comprising means for holding said tubular elements in sealing engagement with said gasket.

11. The face seal fitting according to claim 6, wherein said gasket further includes an outer section in the form of an annulus having a first axial dimension, said inner section is concentric with the annulus of said outer section and has a second axial dimension shorter than said first axial dimension, and said tapered section connects said outer section with said inner section.

12. The face seal fitting according to claim 6, further comprising means for preventing movement of said face seal fitting beyond said second position.

13. The face seal fitting according to claim 12, wherein said movement preventing means comprises an outer section in said gasket, said outer section being interposed between said first and second tubular elements.

14. The face seal fitting according to claim 13, wherein said outer section is interposed between the end faces of said first and second tubular elements.

15. The face seal fitting according to claim 11, wherein said first and second annular end formations are in axial alignment with said inner section of said gasket and said tapered section of said gasket.

16. The face seal fitting according to claim 15, wherein said inner section and said outer section define side faces facing toward said first and second tubular elements, and the distance by which the first and second annular end formations project axially from their end faces is greater than the distance between each side face of the inner section of the gasket and the adjacent side face of the outer section of the gasket.

17. The face seal fitting according to claim 1, wherein said face seal fitting has an optimal sealing condition in which said gasket is clamped between said first and second tubular elements, and said gasket, in a relaxed condition, has an inner diameter equal to the inner diameter of said farthest extending portions of said first and second annular end formations,

said face seal fitting being movable between a first position, in which a non-sealing condition exists and said gasket

is in its relaxed condition, and a second position, in which a sealing condition exists.

18. A face seal fitting comprising a first conduit having an inner surface defining the outer boundary of a flowpath and having a radial end face having an annular nose projecting from said end face, a second conduit having an inner surface defining the outer boundary of a flowpath and a radial end face having an annular nose projecting from said end face, a metal gasket sandwiched between said end faces and making a sealing engagement with said noses, said gasket having an inner cylindrical surface having substantially the same diameter as the inner surfaces of said first and second conduits where said conduits engage said gasket, means to hold said end faces together sandwiching said gasket therebetween with axial pressure applied to said gasket, said end faces with said noses and said gasket being shaped when fully engaged under axial pressure applied by said means to fit together so that no more than minimal dead spaces are defined between said gasket and said conduits at said inner surfaces and said inner surfaces define the outer boundary of a continuous flow path.

19. A face sealing fitting comprising a gasket and at least one tubular member, said tubular member having an inner diameter and an annular sealing bead projecting from a radial end wall of said tubular member, the annular sealing bead having, in axial cross section, a rounded outer profile shaped and positioned to

engage said gasket to form a high pressure seal, and a rectilinear inner profile defining an open passageway within said tubular member adjacent to said gasket, whereby any dead volume in said fitting is minimized when a sealing condition exists in said fitting.

20. The face seal fitting according to claim 19, further comprising means for aligning said tubular element with said gasket.

22. The face seal fitting according to claim 21, wherein said outer section has an axial dimension which limits compression of said sealing bead beyond its elastic limits by engagement with said radial end wall.

23. A method of making a seal in a face seal fitting including

a first tubular element having an end face, an inner surface defining a flowpath and a first annular end formation projecting axially from the end face of said first tubular element;

a second tubular element having an end face, an inner surface further defining said flowpath and a second annular end formation projecting axially from the end face of said tubular element; and

a metal gasket including

an inner section in the form of an annulus having an axis, and

a tapered section extending radially outward from said inner section, said tapered section defining two bevel faces directed away from one another and inwardly toward the axis of said annulus,

wherein said first annular end formation engages one of said bevel faces in a first region, said second annular end formation engages the other of said bevel faces in a second region, said first and second annular end formations having portions extending axially the farthest from the end faces of said first and second tubular elements, each said farthest extending portion lies on the inner surface of its associated tubular element and has an inner diameter, the method comprising:

engaging said bevel faces with said annular end formations; and

tightening said annular end formations against said bevel faces to enlarge the inner diameter of said gasket to a diameter substantially equal to the inner diameter of said farthest extending portions of said first and second annular end formations.